
2.4 Environmental Occurrences

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Onsite and offsite environmental releases of radioactive and regulated materials are reported to DOE and other federal and state agencies as required by law. The specific agencies notified depend on the type, amount, and location of the individual occurrences. In some cases, an occurrence may be under continuing observation and evaluation. All emergency, unusual, and off-normal occurrences at the Hanford Site are reported to the Hanford Site Occurrence Notification Center. This center is responsible for maintaining both a computer database and a hard-copy file of event descriptions and corrective actions. Copies of occurrence reports are made available for public review in the DOE's Hanford Reading Room located on the campus of Washington State University at Tri-Cities, Richland, Washington.

As defined in DOE Order 232.1, emergency occurrences "are the most serious occurrences and require an increased alert status for onsite personnel and, in specified cases, for offsite authorities." There was one emergency occurrence report filed in 1997 and one emergency occurrence filed in early 1998.

An unusual occurrence is defined in the DOE Order as "a nonemergency occurrence that exceeds the Off-Normal Occurrence threshold criteria, is related to safety, environment, health, security, or operations, and requires immediate notification to DOE." There were no environmentally significant unusual occurrence reports filed during 1997 for site contractors.

Off-normal environmental occurrences are classified in the DOE Order as "abnormal or unplanned events or conditions that adversely affect, potentially affect, or are indicative of degradation in the safety, safeguards and security, environmental or health protection, performance or operation of a facility." Several of these occurrences are discussed in Section 2.2.5.4, "Resource Conservation and Recovery Act Inspections;" Section 2.2.6.1, "Clean Air Act Enforcement Inspections;" and Section 2.2.7, "Clean Water Act." The following summarizes some of the emergency and off-normal environmental occurrences not previously discussed or that were not discussed in detail.

For each occurrence summarized below, the title and report number from the Hanford Site Occurrence Notification Center is given in the heading.

2.4.1 Emergency Occurrences

- Chemical Explosion at Plutonium Reclamation Facility
(RL-PHMC-PFP-1997-0023)

On May 14, 1997, at 7:53 p.m., a chemical explosion occurred at the Plutonium Reclamation Facility in the 200-West Area. This facility is part of the Plutonium Finishing Plant and is located approximately 50 km (30 mi) north of Richland, Washington. Additional information on the emergency occurrence is provided in two DOE documents (DOE/RL-97-59, DOE/RL-97-62).

The facility was used to recover plutonium from plutonium-bearing scrap and was in operation from 1964 to 1987, when it was placed in an interim standby status. In 1992 and 1993, in preparation for a readiness demonstration, several hundred gallons of hydroxylamine nitrate solution in dilute nitric acid was prepared in Tank A-109 (the 1,500 L [400-gal] stainless-steel tank involved in the explosion) in Room 40 of the facility. On December 22, 1993, the readiness demonstration was cancelled and the facility, including Tank A-109, was placed in a short-term shutdown on the direction of DOE Richland Operations Office. Some of the acid solution was left in the tank. Between December 1993 and May 1997, the tank experienced water loss because of evaporation. The loss of water concentrated the solution until conditions were reached that caused the normally unreactive solution to undergo a chemical reaction. The reaction generated a rapid release of gases, which generated pressure inside the tank. The pressure blew the lid off the tank, severely damaged Room 40, and cut a small water line. Damage to the facility included the deformation of a wall, the interior doors, and the roof above Room 40.

Environmental releases associated with the explosion included a yellow-brown-colored gaseous plume coming from the main Plutonium Finishing Plant stack and water that was discharged from the severed line. Real-time air measurements of the chemicals released were not possible. Laboratory studies after the accident revealed that the airborne release would have likely consisted of nitric acid, nitrous oxide, various oxides of nitrogen, and water vapor. Of these, only nitric acid and the oxides of nitrogen are recognized to pose a potential health hazard. Atmospheric dispersion modeling was performed to estimate the maximum concentrations at ground level, and these concentrations were below applicable occupational exposure limits. The results of the dispersion modeling indicated that the offsite concentrations of chemicals were negligible. Based on extensive sampling, surveys, and stack monitoring data, no radioactivity was released from the facility stack or the damaged area of the roof. Water from the severed line flooded the building and some of it flowed outside through doorways. Surveys inside and outside the building revealed radioactive contamination on the first floor of the facility and a small area outside that was isolated. The radioactive contamination in the area outside the facility was slightly above background levels. This contamination was likely the result of water flowing across the walls and floors of previously contaminated areas of the facility.

No one was present in Room 40 at the time of the accident. During the initial stages of the emergency response, eight workers passed under the plume path when directed to report to the on-scene emergency center. All eight workers were transferred to and later released from a local medical center. Ongoing occupational health evaluations are being provided as necessary. For further information, see DOE/RL-97-62.

- Small Bottle of Suspect Material Discovered – Alert-Level Emergency Declared
(RL-PHMC-327FAC-1998-0002; Initial Update Report)

On January 28, 1998, a small bottle labeled “picric acid” and containing an unknown dry solid was discovered in a crawlspace off the basement of the 327 Building in the 300 Area. Building personnel had entered the crawlspace to perform an inspection for future steam line work. The bottle was found in a plastic pail next to the crawlspace wall. Because of the location of the bottle and because the dry solid form of picric acid could potentially explode if exposed to flame or friction, an alert-level emergency (defined as the potential degradation of the level of safety

of the facility) was declared. The facility was evacuated, appropriate notifications were made, an incident command post was established, and protective actions were initiated. An entry plan was developed and, following approval, an entry was made into the crawlspace to videotape the bucket, container, and surrounding area. The alert-level emergency was terminated on January 28, 1998 on discovery that the quantity of picric acid involved (approximately 35 to 50 g [0.077 to 0.11 lb]) could not result in a large-enough explosion to compromise the facility. The bottle and its contents were stabilized and removed from the facility on January 30, 1998. Subsequent analysis confirmed that the material was picric acid. No personal injury, personal contamination, or environmental releases occurred as a result of this event.

2.4.2 Off-Normal Occurrences

- Environmental Restoration Disposal Facility #1
Leachate Tank Leak
(RL-BHI-ERDF-1997-0001)

On January 1, 1997, the leachate tanks at the Environmental Restoration Disposal Facility near the 200-West Area were discovered to be leaking. Site personnel discovered a 1- by 1-m (3- by 3-ft) puddle at the base of the tanks below a flange to a crossover pipe between two tanks. The amount of the leak material is believed to be less than 190 L (50 gal). The soil beneath the flange was removed and disposed of in the Environmental Restoration Disposal Facility. The radiological and hazardous chemicals present in the leachate were determined not to pose a hazard to the environment. However, the EPA requires 100% containment of the leachate and notification of any leachate spill.

While investigating this occurrence, it was also noted that the primary liners in the tanks had leaked (each tank has two liners). The secondary liners were not identified to be leaking, and it is believed that no leachate was discharged to the environment from the liner leaks. The leachate was removed from the tanks and the liners were repaired.

- Abovenormal Stack Emissions Resulting from Operation of East K-3 Filter Bank at the Waste Encapsulation and Storage Facility
(RL-PHMC-WESF-1997-0001)

On January 1, 1997, elevated emissions were recorded from the 296-B-10 Stack at the Waste Encapsulation and

Storage Facility in the 200-East Area. This nonroutine release lasted for a maximum of 90 minutes and resulted in an additional dose equivalent to the maximally exposed individual of 0.000002 mrem. The elevated emissions were mitigated by switching the facility's exhaust system to an alternate bank of high-efficiency particulate air filters.

It has since been determined that the most probable contributing factor to this release was extensive flooding (possibly from snowmelt) experienced in the area of the K-3 filter housing, which is located below grade. Portions of the exhaust ductwork were partially submerged, and water worked its way into the ductwork downstream of the high-efficiency particulate air filters. This water then entered the air stream, carrying with it some preexisting contamination from the inside of the duct. All high-efficiency particulate air filter banks have since been tested to verify filter integrity.

- Overflow of Wastewater from Septic System Servicing Trailer at 222-S Laboratory (RL-HMC-ANALLAB-1997-0003)

A septic system servicing the MO0291 trailer at the 222-S Laboratory complex in the 200-West Area overflowed approximately 110 L (30 gal) of waste on January 22, 1997. The overflow was caused by a tripped pump breaker, which was reset. Sanitary maintenance sent a septic pumper truck and removed approximately 6,400 L (1,700 gal) of waste on January 22, 1997. Chlorine bleach was used as a disinfectant on the affected areas.

- Procedural Noncompliance – Onsite Shipping of Hazardous Material from 100-DR-1 (RL-HI-REMACT-1997-0003)

A shipment of hazardous waste was initiated at Operable Unit 100-DR-1 in the 100-D Area on March 21, 1997. Approximately 2 to 4 m³ (3 to 5 yd³) of material containing 13,700 mg/kg of lead were transported to and disposed of in the Environmental Restoration Disposal Facility, exceeding the 5,000-mg/kg maximum limit. This exceedance was discovered on March 24, 1997 and reported on March 25, 1997. This material was removed from the facility and transported back to the originating operable unit, pending final disposition. The material was then shipped back to the facility, encapsulated in concrete, and disposed of in a trench. Because of complete containment within the liners, there was no environmental release.

- Unaccounted-for Loss of Radiologically Contaminated Water from 105-N Lift Station (RL-BHI-NREACTOR-1997-0010)

On April 14, 1997, N Basin, in the 100-N Area, project personnel noticed a decrease in the water level in the pump well (sump) of the 105-N Lift Station. This pump well is used for the collection of water from N Reactor contaminated drains, with most of the recent inventory of water coming from overflow from the 105-N Basin and rainwater. The impact to the environment should be minimal because the loss of water was approximately 25% of the Comprehensive Environmental Response, Compensation, and Liability Act reportable quantity and approximately 50% of the DOE reportable limit. The lift station has been drained and deactivated.

- Spill of Regulated Substance Reported to City of Richland (RL-PNNL-PNNLBOPER-1997-0020)

On July 15, 1997, approximately 9.5 L (2.5 gal) of 50% ethylene glycol coolant were spilled down a floor drain in Room 442 of the Research Technology Laboratory (520 Building) in the Richland North Area. The spill occurred during routine maintenance of a piece of research equipment. The floor drain is connected to the city of Richland sewer. The city of Richland was notified as required. There was no impact to the environment from this release.

- 241-BY Transfer Line SN-200 Potentially Leaking (RL-PHMC-TANKFARM-1997-0074)

On September 11, 1997, approximately 950 L (250 gal) of water, which contained 76 L (20 gal) of dilute citric acid water, potentially leaked from transfer line 200-SN. The transfer line is in a controlled contamination area inside the BY single-shell tank farm in the 200-East Area. The addition of the liquid was part of an attempt to clear a blockage in the line that likely resulted from the line being inactive for an extended period of time. The liquid addition was halted when the liquid did not arrive at the expected end point. All interconnected pits were inspected for water addition. The transfer line was inspected for indications of a pipe leak; however, no moisture or radiation were detected.

- High Tritium Level in Groundwater Monitoring Well K-109A
(RL-PHMC-KBASINS-1997-0022)

On September 25, 1997, a routine monthly sample at groundwater well 199-K-109A, near the 105-KE D Sump in the 100-KE Area was collected. The analysis revealed a reading of 386,200 pCi/L of tritium. On October 7, 1997 a second water sample was collected and analyzed by K Basin personnel that showed 386,300 pCi/L of tritium. The tritium concentrations increased over three times from recent measurements. The most likely cause of the elevated tritium concentration is that a steady increase in groundwater levels in this area led to a leaching of existing contamination from past-practice waste sites associated with reactor operations.

- Elevated Level of Regulated Contaminant Found in Environmental Sample of Receiving Water for 300 Area Treated Effluent Disposal Facility
(RL-PHMC-300LEF-97-0005)

On October 10, 1997, the 300 Area Treated Effluent Disposal Facility received laboratory analysis results for the annual Columbia River water samples taken upriver and downriver of the facility's discharge point on September 17, 1997. The results indicated radium-226 at 8.3 pCi/L and radium-228 at 5.9 pCi/L downstream of the discharge point. The maximum contaminant level specified by the Washington State Department of Natural Resources land lease for the facility are 3 pCi/L for radium-226 and 5 pCi/L for radium-228. Reanalysis of the samples was requested, and the results were still above the permit limits. Notifications were made to the Washington State Department of Health. A review of the data taken from the effluent samples prior to the discharge indicated that during the facility's operating history, no effluent sample exceeded the detection limits for total radium (0.07 to 0.23 pCi/L). Biweekly compliance sampling for effluent was conducted on the same date as the

elevated river sample, with undetected levels of total radium (0.16 pCi/L detection limit). These data indicate that the 300 Area Treated Effluent Disposal Facility may not be the source of the contamination.

- 200-ZP-1 Interim Action Pump-and-Treat System Exceeds Maximum Contaminant Level for Carbon Tetrachloride
(RL-BHI-GROUNDWTR-1997-0003)

On December 26, 1997, liquid effluent from the 200-ZP-1 interim action pump-and-treat system in the 200-West Area was reported as exceeding its discharge criterion of 5 µg/L for carbon tetrachloride. The system collects groundwater containing carbon tetrachloride from six extraction wells, reduces the contamination level, and releases the water to a well upgradient of the extraction wells and within the existing plume boundary. Treated liquid releases on December 26, 1997 contained carbon tetrachloride levels of approximately 11 µg/L. The cause of the increased carbon tetrachloride in the effluent stream was associated with the die-off of green algae in the stripper column coupled with normal degradation in the operating efficiency of the stripper column. Corrective actions, such as adding packing material, were taken to prevent future occurrences.

- Diesel Fuel Station Spill
(RL-PHMC-FSS-1977-0001)

On February 4, 1997, diesel fuel was discovered on soil near the 6291 Building (Fuel Station) in the 200-East Area. The fuel station was shut down for a short time. No dangerous waste or radioactive materials were released. The diesel contamination was above the regulatory limit (WAC 173-340) level, but below the reportable quantity under 40 CFR 302.4. It is expected that naturally occurring bacteria will reduce the level of contamination without the need for aggressive remediation.